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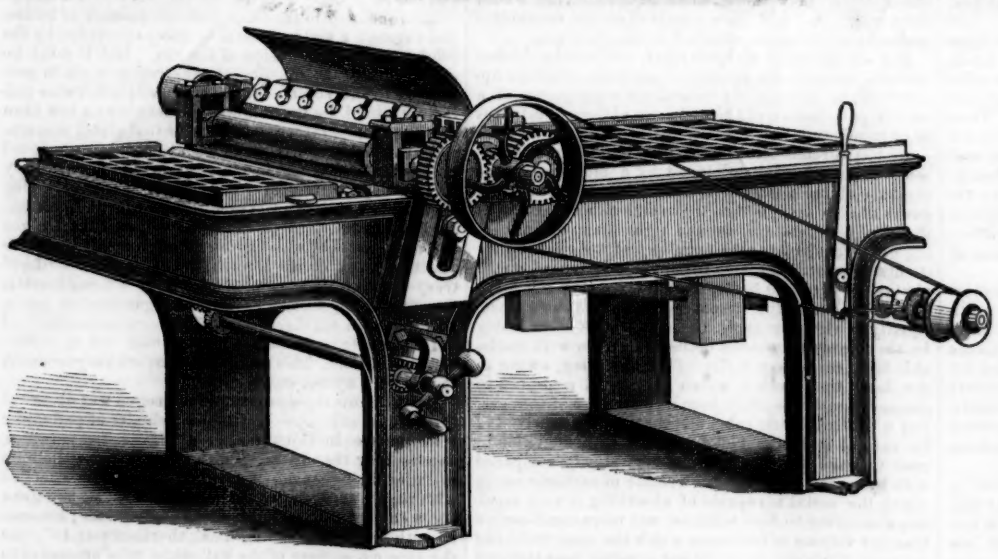
Woodworth Planer.

There are few labor-saving machines, if any, which have proved of equal benefit to the public, and gained the reputation of a larger success than the Woodworth Planer. Those old-fashioned times, no longer than 20 years ago, when the Jack-plane and Try Square slowly and wearily accomplished their toilsome mission have passed away, and given place to the beautiful automatic, almost sentient piece of mechanism above referred to, which turns out a quality, quantity, and variety of work which the former apprentice of the Jack-plane would have as much difficulty to comprehend, could he, Van Winkle-like, arouse from his long slumber, as did the ancient Winkle, the changes that had occurred in his native village.

Herewith we give an illustration of the small surface



WOODWORTH PLANER.

machine with two top feed rolls attached to the cutter head slides, which move up and down with the head.

This machine is well adapted for shop work—for carpenters, box makers, and cabinet makers, or any kind of light planing. The frame is made of cast iron, heavy and substantial: the cutter head is wrought iron. The rolls are weighted in a very convenient manner, and will plane stuff to 3½ inches thick, and 24 inches wide. The tight and loose pulleys are 12 inches diameter, 6 inches face, and should make 800 revolutions per minute. Weight, 1400 pounds.

The following are some of the advantages claimed by the inventor for their machines: "They have the benefit of Burleigh's Patent Expansion Feed Gears; also their own improved weighted feed rolls; they weight the rolls that the lumber passes through before it reaches the cutter head, giving at all times an equal pressure in all inequalities of the lumber, which cannot be obtained by rubber springs. Their machines are built under their own immediate care and supervision, in the most thorough manner, from the best of stock; they intend these machines shall be superior to any in the market.

Hampson & Copeland, 89 Liberty street, New York, manufacture and sell this machine, also three sizes of planing, tongueing and grooving machines, and four sizes of surfacing machines.

For further information apply as above stated.

New Air-compressing Machine.

In connection with the construction of the Mont Cenis tunnel it will be recollected that Mr. Frederic Seiler, of Berne, Switzerland, devised an ingenious hydro-pneumatic apparatus, and in the August number of the *Scientific Review* it is stated that the inventor proposes some improvements, and to render its action in every respect more perfect, so that it may not improbably be turned to account for working some of our coal-cutting machinery, and may, perhaps, be as easily worked by steam as by water-power. The new apparatus which is about to be introduced to public notice resembles in its action that of a cylinder and piston of an ordinary blowing-engine. The lower end of the air cylinder forms the outside of an annular pit, and the inner side of this annular pit is formed by a second inverted cylinder of smaller diameter, which forms at the same time the bottom of the air cylinder. The annular pit is filled with water, into which a third inverted cylinder or air vessel is made to dip. This air vessel forms the piston of the air cylinder, and is provided with a piston-rod secured to its top, and passing downwards through a stuffing-box in the cylinder bottom, and through a second stuffing-box into a hydraulic cylinder placed in the centre of the chamber formed by the interior of the air cylinder bottom. At the lower end of the said piston-rod is fixed the hydraulic cylinder piston. The hydraulic cylinder is fitted with a slide or other valve arrangement, by means of which the water is admitted, and again discharged at both ends of the cylinder alternately, in the same manner as steam is in the steam cylinder. In the top and bottom of the air cylinder suction and pressure valves are fitted, the latter leading by pipes to an air accumulator. The air accumulator consists in an inverted cylinder or vessel of sheet-iron, again similar to a gasholder, which stands in a pit filled with water. On the top of the vessel a tank is formed for holding water, by which the vessel is weighted to the desired air-pressure. The compressed air enters by a pipe passing through the bottom of the pit and reaching above the water level, and a second pipe, similarly placed conducts the compressed air from the accumulator to its destination.

Gas Heat for Steam.

In one of the piles of warehouses belonging to the London and St. Katharine Dock Company, in Cutler street, says the *London Builder*, steam machinery has been introduced, the different fire offices having approved Jackson's patent, by which the boiler is heated by gas instead of coals. The east area of the dock company's premises will henceforth be worked by the steam lift, without any additional premium being incurred by its adoption. The boiler is placed in a small house built out from the top floor between two warehouses; for there is this stipulation, that even the safe gas-furnace shall not be actually inside the walls, among the merchandise. A considerable length of pipe is therefore necessary through which the steam passes before it can be brought to bear on the engine; but the tube is covered with a coating which is so good a non-conductor that the radiation of heat is very trifling. The circular furnace beneath the boiler contains a series of burners which, when they are all lighted, will raise steam to fifty pounds from cold water in twenty-five minutes. The burners may then be extinguished with the exception of one or two, which are sufficient to keep the pressure-guage stationary, until power is wanted, when instantaneously the furnace is rekindled, and the engine set in motion. The lift is sixty-five feet from the ground below, and more than five hundred chests of tea are raised in an hour.

—A mine of bismuth has been opened in Wayne Co., and aside from its value in bismuth gives promise of being rich in silver.

On the Occlusion of Hydrogen Gas by Metals.

By Thomas Graham, F.R.S.

[From the London *Chemical News.*]

In my experiments, already published, on the occlusion of hydrogen by the metals palladium, platinum and iron, the absorption of the gas was observed to be of uncertain occurrence at low temperature, but was ensured by heating the metal, whether in the form of sponge or aggregated by hammering, and allowing it to cool slowly and completely in a hydrogen atmosphere. This fact was referred to the condition of absolute purity of the metallic surface being essential to the first absorbing action, as it is to the action of platinum foil or wire in determining the combustion of the gaseous mixture of oxygen and hydrogen, as observed by Faraday. A new method of charging the metals with hydrogen at low temperatures has lately presented itself, which is not without interest.

When a plate of zinc is placed in dilute sulphuric acid, hydrogen is freely evolved from the surface of the metal, but no hydrogen is occluded and retained at the same time. A negative result was, indeed, to be expected from the crystalline structure of zinc. But a thin plate of palladium immersed in the same acid, and brought into metallic contact with the zinc, soon becomes largely charged with the hydrogen, which is then transferred to its surface. The charge taken up in an hour by a palladium plate, rather thick, at 12° amounted to 173 times its volume.

The absorption of hydrogen was still more obvious when the palladium plate was constituted the negative electrode in acidulated water to a Bunsen battery of six cells. The evolution of oxygen gas at the positive electrode continuing copious, the effervescence at the negative electrode was entirely suspended for the first twenty seconds, in consequence of the hydrogen being occluded by the palladium. The final absorption amounted to 200·4 volumes, and was greater in amount than the volume of hydrogen occluded by the same plate heated and cooled in an atmosphere of the gas, which did not exceed 90 volumes.

It is worthy of remark that, although the hydrogen enters the palladium and no doubt prevades the whole mass of the metal in such circumstances, the gas exhibits no disposition to leave the metal and escape into a vacuum, at the temperature of its absorption. Thus a thin plate of palladium, charged with hydrogen in the manner described, was washed, dried by a cloth, and then sealed up in an exhausted glass tube. On breaking the tube under mercury after two months, the vacuum was found perfect. No hydrogen had vaporized in the cold (about 12°); but on the application afterwards of a heat of 100° and upwards, 333 volumes of gas were evolved from the metal.

A similar result was obtained on making a hollow palladium cylinder, of which the length was 115 millimetres, diameter 12 millimetres, and thickness 1 millimetre, the negative electrode in an acid fluid, while the closed cavity of the cylinder was kept exhausted by means of a Sprengel aspirator. No hydrogen whatever passed through into the vacuous cavity in several hours, although the gas was no doubt abundantly absorbed by the outer surface of the cylinder and prevaded the metal throughout.

It appears, then, that when hydrogen is absorbed by palladium the volatility of the gas may be entirely suppressed; and hydrogen may be largely present in metals without exhibiting any sensible tension at low temperatures. Occluded hydrogen is certainly no longer a gas, whatever may be thought of its physical condition. The same conclusion was indicated by another series of experiments, in which it was found that, to be occluded by palladium, and even by iron, hydrogen does not require to be applied under much pressure, but, on the contrary, when highly rarefied is still freely absorbed by these metals.

The occluded hydrogen is readily extracted from palladium by reversing the position of the latter in the decomposing cell of the battery, so as to cause oxygen to be evolved on the surface of the metal. The hydrogen is then drawn out as rapidly as it had previously entered the palladium, and the metal is exhausted in a complete manner by such treatment. When palladium charged with hydrogen is left exposed to the atmosphere, the metal is apt to become suddenly hot, and to lose its gas entirely by spontaneous oxidation.

Platinum may be charged with hydrogen by voltaic action, as well as palladium, but with the usual inferior proportion of gas. The charge of hydrogen taken up in a decomposing voltaic cell by old platinum in the form of a tube, of the thickness of a small crucible, was 2·19 volumes. This absorbed gas was also readily withdrawn from the platinum and oxidized on reversing the place of the metal in the decomposing cell. The platinum acquired its well-known polarizing-power in virtue of the occluded hydrogen. This power was retained by the metal after being washed with pure water and wiped with a cloth, and was brought into action on placing the metal in dilute acid. The temperature required to expel the hydrogen so absorbed by platinum was found to be little short of a red heat, although the gas had entered the metal at a low temperature.

Soft iron, left some time in a dilute acid, occluded 0·57 volume of hydrogen. This charge of gas was also retained at low temperatures, and did not escape into a vacuum till the temperature was raised nearly to redness. This proves that, like platinum, iron is not penetrated through in the cold by hydrogen, the temperature of emission being elevated considerably.*

While hydrogen was absorbed freely by palladium and platinum as negative plates, no oxygen whatever was absorbed by plates of the same metals in the position of positive electrodes. Oxygen gas was disengaged freely on the surface of the latter without being condensed. A platinum plate which had acted for several hours as a positive electrode, gave afterwards, when submitted to heat without exhaustion, a small trace of carbonic acid, but no oxygen.

The familiar igniting-power of platinum sponge (or clean plate) upon a jet of hydrogen in the air seems to depend solely upon the influence of the metal upon its occluded hydrogen. The hydrogen appears to be polarized, and to have its attraction for oxygen greatly heightened. I beg to offer the following representation of this phenomenon, with an apology for the purely speculative character of the explanation. The gaseous molecule of hydrogen being assumed to be an association of two atoms, a hydride of hydrogen, it would follow that it is the attraction of platinum for the negative or "chlorylous" atom of the hydrogen molecule which attaches the latter to the metal. The tendency, imperfectly satisfied, is to the formation of a hydrine of platinum. The hydrogen molecule is accordingly polarized, *oriente*, with its positive or "basylous" side turned outwards, and having its affinity for oxygen greatly enlivened. It is true that the two atoms of a molecule of hydrogen are considered to be inseparable; but this may not be inconsistent with the replacement of such hydrogen atoms as are withdrawn, on combining with oxygen, by other hydrogen atoms from the adjoining molecules. It is only necessary to suppose that a pair of contiguous hydrogen molecules act together upon a single molecule of the external oxygen. They would form water, and still leave a pair of atoms, or a single molecule of hydrogen, attached to the platinum.

The oxidation of alcohol, ether, and similar hydrocarbons, through the agency of platinum, likewise appears to be always an immediate consequence of a similar polarization of the hydrogen of those substances or of some other oxidizable constituent.

As has already been remarked, it does not follow that, because a gas is occluded by a metal under the pressure of the atmosphere, at a low temperature, the gas will also escape from the metal into a vacuum at the same temperature, a much higher temperature being often required for the expulsion of the gas than for its first absorption. This is particularly true of carbonic oxide occluded by iron. Cast iron is much too porous for such experiments, and allows carbonic oxide, equally with other gases, to pass through abundantly by the agency of gaseous diffusion. Even with malleable iron there is a difficulty in observing, owing to the long time during which that metal continues to discharge carbonic oxide from its own store of that gas. But a malleable iron tube, first thoroughly deprived of its natural gas, was found to allow carbonic oxide to pass through it into a vacuum very slowly compared with hydrogen, although the volume of carbonic oxide which the metal is capable of absorbing is very sensible, amounting to four volumes, and more considerable than the volume of hydrogen which the same metal can occlude. Carbonic oxide did not sensibly pass through iron of 1·7 millimetre in thickness till the temperature was greatly elevated; and then the passage of gas was, in a minute—

Of carbonic oxide, at a full red heat, 0·284 cubic centimetres per square metre of surface.

Of hydrogen, at a full red heat, 76·5 cubic centi metres per square metre of surface.

The condition of hydrogen as occluded by a colloidal metal may be studied with most advantage in its union with palladium, wherein the proportion of gas held is considerable. In the pulverulent spongy state, palladium took up 655 volumes of hydrogen; and so charged it gave off no gas *in vacuo* at the ordinary temperature, nor till its temperature was raised to nearly 100°.—Hammered palladium foil has been observed to take up quite as much gas. But the condition in which palladium appears to be most absorptive is when precipitated from a solution of about 1·6 per cent. of the chloride, by the action of a voltaic battery, in the form of a compact metal. Palladium is not of the metals readily thus precipitated: but it may be thrown down upon a thin platinum wire, in brilliant laminæ, by the action of a large single cell. The palladium after a time detaches itself from the wire, exhibiting a bright white metallic surface where it had been in contact with the platinum, and a dull surface suggesting metallic arsenic, on the side exposed to the acid. As so prepared, it does not contain any occluded hydrogen. But the metallic films, when heated to 100° in hydrogen, and allowed to cool slowly for an hour in the same gas, were found to occlude 982·14 volumes of gas, measured with the thermometer at 11°, and barometer at 756 millimetres. This is the largest absorption of hydrogen observed. From palladium so charged there was a slight indication of the escape of hydrogen into a vacuum, with extreme slowness in the cold. This charged palladium is represented by weight as—

Palladium 1·0020 grm.	99·277
Hydrogen 0·0073 grm.	·723
	100·000

It is in the proportion of one equivalent of palladium to 0·772 equivalent of hydrogen,* or there is an approximation to single equivalents Pd H. But the idea of definite chemical combination is opposed by various considerations. No visible change is occasioned to the metallic palladium by its association with the hydrogen. Hydrides of certain metals of the hydride of copper (Wurtz) and the hydride of iron (Wanklyn); but they are brown pulverulent substances, with no metallic characters. Indeed a hydride of palladium itself can be formed, but not preserved on account of its great instability. Following the process of M. Wurtz for the hydride of copper, nitrate of palladium was boiled with sulphuric acid, and the sulphate of palladium (a red crystalline salt) prepared. A solution of this salt, with an excess of sulphuric acid, pas precipitated by the hypophosphite of soda; a black powder fell, which speedily underwent decomposition at 0°, evolving copious volumes of hydrogen gas. The final residue appeared to be pure palladium, of its usual blace amorphous appearance, and with no trace of crystallization. It is singular that this palladium precipitate contained no occluded hydrogen; and even when dried, and afterwards exposed to an atmosphere of hydrogen in the usual manner, the palladium black so prepared condensed no sensible quantity of that gas. It acquired this property, however, after being heated to redness and converted into grey palladium.

I am inclined to conclude that the passage of hydrogen through a plate of metal is always preceded by the condensation or occlusion of the gas. But it must be admitted that the rapidity of penetration is not in proportion to the volume of gas occluded; otherwise palladium would be much more permeable at a low than at a high temperature. A plate of that metal was sensibly exhausted of hydrogen gas at 267°, but continued permeable, and in fact increased greatly in permeability at still higher temperatures, and without becoming permeable to other gases at the same time. In a striking experiment, a mixture of equal volumes of hydrogen and carbonic acid was carried through a small palladium tube, of which the internal diameter was 3 millimetres, and the thickness of the wall 0·3 millimetre. From the outer surface of this tube gas escaped into a vacuum, at a red heat, with the enormous velocity of 1017·54 cubic centimetres per minute for a square metre of surface. This gas did not disturb baryta-water. It was pure hydrogen.

A still more rapid passage of hydrogen was observed through the substance of a hollow cylinder of palladium 1 millimetre in thickness, at a higher temperature, approaching the melting-point of gold. The palladium cylinder being enclosed in a porcelain tube charged with pure hydrogen, was exhausted as usual, and gave 105·8 cubic centimetres of gas in five minutes; measured with barometer 753 millims., thermometer 10°. As the external surface of the palladium tube amounted to 0·0053 square metre, the passage of gas was—

3992 22 cubic centimetres (4 litres nearly) to form a square metre of surface, per minute.

The rate of penetration of hydrogen through the same palladium tube, at the lower temperature of 265° C., was previously observed to be—

327 cubic centimetres from a square metre of surface, per minute.

The velocity of penetration thus appears to increase in a rapid ratio with the temperature.

When carbonic acid was substituted for hydrogen, at the same high temperature, a very minute penetration was perceived, amounting to—

1·86 cubic centimetres from a square metre of surface, per minute.

This gives for carbonic acid one twenty-thousandth part of the rate of hydrogen. Whether it is a penetration of the same sort, though greatly less in degree, or rather the consequence of a sensible porosity in the palladium (of which it would become the measure) remains uncertain.

The quantity of hydrogen held by the metal at these

* In M. Cailletot's experiment of exposing a thin sheet of iron to an acid, the metal is no doubt penetrated through by hydrogen in the cold, but apparently from the penetrating agency of the acid which is insinuating itself into the metal at the same time.—"Comptes Rendus," May 4, 1868.

* H = 1, Pd 106·5.

high temperatures may become too small to be appreciated; but I presume it is still present, and travels through the metal by a kind of rapid cementation. This extreme mobility is a singular property of hydrogen, which was involved in the fundamental discovery, by MM. H. Sainte-Claire Deville and Troost, of the passage of that gas through plates of iron and platinum at high temperatures.

The marked rapidity of the passage of the same gas through a thin sheet of caoutchouc appears to be more capable of explanation on known principles. Caoutchouc of less than 0·1 millimetre in thickness, if impregnated with hydrogen, loses its gas entirely by the most momentary exposure to the air. A tube of two millimetres in thickness, through which hydrogen and carbonic acid were singly passed, each for an hour, was found to retain—

Of hydrogen .. .. 0·0113 volume.
Of carbonic acid .. 0·2200 "

The absorption, then, is in the proyortion of one hydrogen to twenty carbonic acid; but the comparative rate of penetration of the two gases through a sheet of caoutchouc is as one hydrogen to two and a half carbonic acid; or the hydrogen moves eight times as rapidly as the density of its solution would indicate. But these gases differ in diffusibility as carbonic acid 1 to hydrogen 4·7. The rapid passage of hydrogen through caoutchouc is thus partly explained by the rapid manner in which that gas is brought to one surface of the sheet and conveyed away from the other by gaseous diffusion. Again, both substances travel through the substance of the caoutchouc by their diffusibility *as liquids*. Suppose hydrogen in that form to be nearly as much more diffusive than the other substance as it is when both are gaseous, then the observed rapid passage of hydrogen through caoutchouc would appear to be fully accounted for.

Liquid diffusion has also a bearing upon the rapid dissemination of hydrogen through a soft colloid metal, like palladium or platinum, at a high temperature. The liquid diffusion of salt in water is known to be six times as rapid at 100° as at 0°. If the diffusion of liquid hydrogen increases with temperature in an equal ratio, it must become a very rapid movement at a red heat. Although the quantity absorbed may be reduced (or the channel narrowed), the flow of liquid may then be increased in velocity. The whole phenomena appear to be consistent with the solution of liquid hydrogen in the colloid metal. The "solution affinity" of metals appears to be nearly confined to hydrogen and carbonic oxide, so that metals are not sensibly penetrated by other gases than these.

An Important Enterprise.

The railroad connecting the shores of both oceans, via the Isthmus of Panama, was unquestionably a great work of engineering skill, and conferred incalculable benefits upon the commerce of the East and West. It placed us, so to speak, *en rapport* with India, China and Japan. But in this wonderful age of progress we have come to regard every victory which science obtains over natural obstacles to the union of countries geographically far distant from each other, as only the herald of future and greater victories in the same direction. So, as we have succeeded in making a railroad across one Central American Isthmus, there seems to be no good reason why we should not succeed in cutting a canal through another. What stands between us and the completion of such an interoceanic communication? Only *thirty four miles* of land, the highest elevation of which is not more than forty feet. Our attention has been directed to this subject by a recent conversation which President Johnson is reported to have had with General Acosta, the newly accredited Minister of the Columbian Government to this country, wherein he adverted to the vast importance of such an undertaking, and assured the General that if the United States of Columbia would afford some substantial encouragement to our people, to construct a canal via the Isthmus of Darien, through which ships might pass from ocean to ocean, without unloading, the great work would soon be accomplished, so soon, indeed, that in all human probability, the long-wished for and long talked of ship canal might be opened for navigation in about two years from the breaking of the first sod.

There can be no doubt that if the colonial government will signify its willingness to adopt the President's suggestion, the canal, ere long, will be an accomplished fact, and become, as soon as completed, the favorite route from the Atlantic to the Pacific.

Our own government, too, provided there be no constitutional difficulties, would find it highly advantageous, both politically and commercially, to grant pecuniary facilities, similar to those which were accorded to the Union Pacific Railroad Company, to an Isthmus of Darien Ship Canal Company. *Will it pay?* This is a question which may be safely replied to in the affirmative. Indeed, we cannot see how it could be answered otherwise.—*Mercantile Journal.*

Extracts from the Inaugural Address of Thomas G. Barlow, C. E.

[Delivered before the British Association of Gas Managers, on the 2d of June, 1868.]

We cull the following extracts from the Inaugural Address of Thomas G. Barlow, which will perhaps be of sufficient interest to our readers to warrant their publication. The necessity and importance of organizing an American Association of Gas Managers becomes more apparent each year. The advantages, as we have repeatedly stated, that would accrue to the gas interest throughout this great country are incalculable; and it is a source of surprise and regret to us, and, we doubt not, to others that the time and place of meeting cannot be definitely agreed upon. We hope, however, to live to witness such a meeting of the representatives of one of the country's greatest interests.

Mr. Barlow says of

NEW METHODS FOR GAS-MAKING.

In considering the progress that has been made in the manufacture and distribution of gas during the past year, the new inventions and new processes which have been adopted or tried with prospect of success deserve to be especially noticed. Foremost among them is Mc. Kenzie's process for producing gas of high illuminating power from small coal mixed with crude shale oil. The pressure which the Legislature has recently put on gas companies to raise the standard of illuminating power considerably above that obtainable from common coal has compelled most of them to use a certain proportion of cannel coal at a heavy cost and with a diminution in the value of the coke. The advance in the price of cannel consequent on the increased consumption has stimulated inquiry to find a substitute for it, and this seems to have been accomplished by Mr. McKenzie, whose process has been successfully adopted on a large scale at the Alliance Gas-Works, in Dublin. The small coal is well mixed with the oil in the proportions varying from 10 to 30 gallons to 1 ton of coals. This is effected by means of a mixing or grinding mill. The compound material is then distilled in ordinary gas-retorts of clay or iron at a strong heat approaching a white heat. I have recently witnessed an experiment on a mixture of Llantwit small coal shipped at Cardiff, and costing in Dublin 12s. 6d. per ton, with 5 per cent. of Broxbourne shale oil, costing £5 per ton, the produce of the distillation of one ton of which mixture was

9750 cubic feet of gas of 21.5 candles illuminating power.
37 bushels of good hard saleable coke.
2 bushels of breeze.
11 gallons of tar.
15 gallons of ammoniacal liquor of 5° Twaddle.

The cost of this mixture, including royalty was about 17s. per ton against 24s. for Wigan cannel, over which it has the advantage of at least 5s. per ton in the value of the coke.

Two other new sources of supply of materials for producing gas of high illuminating power have been proposed—viz., New Brunswick albertite and Trinidad bitumen. From the results of experiments on the former made by Mr. Evans, at the Horseferry Road works of the Chartered Company, it appears that the yield per ton is from 91,66 to 10,200 cubic feet of gas, varying in illuminating power from 28·66 to 35·42 candles, from which quantity, however, 10 per cent. must be deducted in practical operations on a working scale, and the material is offered for sale in London at 37s. 6d. per ton. Trinidad bitumen does not present quite the same advantages. When mixed with 80 per cent. of Newcastle coal the yield per ton, according to the joint experiments of Dr. Letheby and Mr. Keats, was 10,600 cubic feet of 17·6-candle gas, and it could be sold in London at from 45s. to 50s. per ton. There is, however, the serious drawback to the use of Trinidad bitumen that it contains a large amount of sulphur and water. These applications of shale oil and bituminous substances, more especially that of shale oil, afford reason to believe that the threatened difficulty arising from the scarcity of cannel consequent on the greatly increased demand may in some measure, if not entirely, be overcome.

MACHINES FOR DRAWING AND CHARGING RETORTS.

Of the mechanical appliances for the charging of retorts, by which a large system of retorts set in one oven may be charged at once, by a number of scoops operating at the same instant, Mr. Barlow says: The plan has been practically tried at the Alliance Gas-Works, in Dublin, and I am able to speak of it very favorably. A new retort-house has been erected, capable of carbonizing 300 tons of coal in a day, and containing 270 double retorts, or 540 mouth-pieces, the charging and discharging of which is performed by two machines, and hitherto with complete success. Best & Holden's "steam stoker," as the machine has been termed, appears to be destined to make a revolution in the retort-house arrangments of all large gas-works that may be henceforward constructed. The inventors have obtained three patents for different applications of their machinery for charging retorts, some parts of which may be applied to small works. I recommend any engineer who is contemplating the erection of a large retort-house to examine the working of Messrs. Best & Holden's steam stoker at the Alliance Company's works. The company deliver the coals into a hopper at the top of the machine, and remove the coke from the stoke hole, and the patentees have contracted for the charging and discharging of the retorts at the rate of 9d. per ton, including royalty, the cost under the old system having been 1s. 7d.

ARRANGEMENT OF THE DIP-PIPE.

Some modifications have been made in the form and arrangement of the dip pipe deserve to be mentioned, as they tend to remove the inconveniences that arise from the necessity of having the dip-pipe sealed in the hydraulic main. An American inventor has suggested an alteration in the old form of hydraulic main by casting the dip on its side, as shown in the diagram produced. This method of forming the dip-pipe presents some advantages in clearing out, and it avoids the inconvenience attending the collection of pitch round the mouths of the pipes. A more important arrangement of the dip pipe, having for its object the removal of the pressure in the retorts occasioned by the seal in the hydraulic main, has been contrived by Messrs. Cockey & Sons. The necessity for relieving the retorts from that pressure was recognized in the early stages of the introduction of clay retorts, and Spinney's contrivance for that purpose is, I believe, still in use in several gas-works. By the contrivance of Messrs. Cockey the pressure is entirely removed by the exhauster during the time the coal is being carbonized. This arrangement is called by the inventors a "telescopic" dip-pipe, that portion of it which enters the tar in the hydraulic main being made to slide up, like the tube of a telescope, as soon as the retort is charged; the action taking place by means of a lever to which a handle is attached. Before loosening the lid of the retort the telescopic part of the pipe is lowered again into the tar to prevent the gas from passing back into the retort.

GAS AS A MOTIVE POWER.

The successful application of the explosive force of gas as a motive power opens an extensive field for the demand for gas for day consumption in manufacturing towns; and I cannot forbear expressing surprise that gas companies have not made exertions to promote the use of the gas engines. Improvements have been made on the original form of the Lenoir engines by Messrs. Kinder and Kinsey, by which its power and efficiency have been considerably increased.

Great Discovery in Anaesthetics.

A Paris letter says: Dr. Thomas W. Evans has recently effected an improvement in the administration of nitrous oxide gas, which is as interesting from a scientific as from a strictly surgical point of view, and which must work great good in the world. One of the principal objections which have hitherto been urged against the use of this gas as a substitute for chloroform and ether has been its bulk, and the consequent inconvenience of carrying it to the place where it is to be used. Wishing to obviate this difficulty, Dr. Evans instituted a series of experiments which resulted in his obtaining the gas in a liquid and portable form. Liquefaction is brought about by mechanical pressure, and the liquid gas is secured in bronze bottles, holding a quart (1,000 grammes) or a pint (500 grammes) each. The fluid represents not far from four hundred times its volume of gas, and about twenty-five grammes are generally found sufficient for an average operation. The liquid gas, when to be used, is drawn off through a stop cock into a caoutchouc bag, when it rapidly assumes its original volume in the usual way. Nitrous oxide thus condensed has been recently administered by Dr. Evans at the dental hospital in Paris, as well as in London, in the presence of large numbers of dentists and surgeons, with the greatest success. The gas was found to be more rapid in its action, and of a better quality than is commonly used, the process of liquefaction being also apparently one of purification. The practical value of this improvement in preparing and administering the gas promises to be very great. Dr. Evans has also suggested, in view of the rapid evaporation of liquid nitrous oxide, and its consequent great refrigerating power, that it may prove the most effective agent for the production of local anæsthesia. A number of successful experiments have already been made with reference to this special application. The results so far obtained are certainly most interesting. Nitrous oxide has been clearly demonstrated to be the least dangerous of those commonly employed in general anæsthetics. Should Dr. Evans succeed in giving it to the world in a cheap, profitable, and convenient form, he will have conferred a true boon, not only upon his profession, but upon humanity.—*City Exchange.*

Utilization of Sewage.

A series of experiments have been made at Clichy, on the Seine, near the mouth of the great collector of Asnieres, with the view to the solution of the important question of the application of sewage water, with regard to sanitary and agricultural considerations. The experiments include the direct application of sewage water, without any previous preparation. According to the report made by M. Mille, the engineer entrusted with the experiments, the chemical purification is obtained by means of sulphate of alumina, which precipitates the solid matter held in solution. The cost of this process is said to amount only to two centimes, or less than a farthing per ton, and the value of the solid manure is given at nineteen francs (fifteen shillings) per ton. The direct application of unprepared sewage water by means of irrigation is reported to have yielded excellent results last year; thus treated Indian corn gave a crop equal to nearly four tons and a half per acre, while crops of beetroot exceeded twelve tons per acre. The experiment with pumpkin was also eminently successful. A jury appointed to taste the different products came to the decision that the increased size did not seem to have injured the flavor or other qualities, and that there was no evidence of taste or smell of the system adopted. It should be stated that the quantity of sewage water used in these cases was not greater than that ordinarily supplied by market gardeners to their lands after they have been manured. The experiments commenced at Clinchy are to be pursued upon a much larger scale on the plan of Gennevilliers.—*Society of Arts Journal.*

An article under the above caption appeared in the *American Artisan* of October 7, in which the writer says:

The noxious but manurial matter existing in the sewage of towns is so diluted that the value of the sewage is commonly estimated as being only about four or five cents per ton, and consequently the sewage in its liquid form could only be applied with any prospect of profit to fields lying comparatively low and of easy access from the towns whence the sewage water is derived. This has led to many attempts to separate the manurial matter from the water, one of which consisted in mingling milk of lime therewith to precipitate the matter; this being, however, of little use except as a deodorizer and disinfectant, inasmuch as the ammonia, one of the chief manurial agents, is expelled and lost. We notice in an English exchange that two chemists, Messrs. Robert G. Sillar and George W. Wigner, have recently patented in England a new compound, consisting of animal charcoal, blood, clay, alum, and certain other materials, which is stated to possess the power of precipitating nearly all the manurial matter of the sewer water, "the precipitate settling in a flocculent mass, and the residuum requiring only to be dried and treated with a simple acid to render soluble certain of the constituents for the use of plants."

If this compound is capable of doing all that is claimed therefor it is certainly a valuable discovery; but the mention in this connection of a "simple acid to render soluble the constituents of the manure," leads us to doubt the correctness of the reasoning on which the inventors appear to have proceeded. The manurial matter in the sewer-water is so highly organic in its nature, and so liable to be decomposed by natural agencies, that no acids or other chemicals are needed to render its constituents sufficiently soluble to be absorbed by the roots of plants.

Water Velocipede.

An ingenious application of the principle of the velocipede in water locomotion may now be seen on the lake of Enguien, near Paris. The form of this new species of naval construction is that of the twin ship tried some years back on the Thames, the motive power being placed in the middle instead of on each side as in ordinary paddle steamers. A pair of hollow water-tight pontoons, about 12 ft. long, 10 in. wide in the thickest part, and tapered to a point at each end, are fastened together about 20 in. apart by transverse bars near the extremities. In the centre is placed the seat, rising about two feet above the water, and supported by iron rods. In the front is the paddle-wheel, about 3 ft. in diameter and 8 in. broad, provided with sixteen floats, the axle turning on stout iron uprights, and the rotary motion being obtained from cranks worked by the feet. This little vessel is steered by rudders at each of the sterns, and moved by lines. The pontoons being made of thin mahogany planks, the whole construction is very light, and glides along with astonishing rapidity. This water velocipede, having been built as a first experiment, is no doubt susceptible of improvement in some of its details, but the principle may be already pronounced a complete success. The inventor is M. Thierry, an architect, of Paris.—*Galignani.*

The New York Society of Practical Engineering.

[REPORTED FOR THE AMERICAN GAS-LIGHT JOURNAL.]

This society met at it its room, No. 24 Cooper Institute, on Tuesday evening, October 13th, the President, James A. Whitney, in the chair; W. B. Harrison, Recording Secretary.

Before entering upon the regular subject for the evening, the attention of those present was called to a model, submitted by Mr. J. Harrison, of an improved apparatus for clearing streets from snow, which may be briefly described as follows; A suitable frame is mounted on wheels and on this frame the engine and boiler rest which propels the machine. At the rear end of the apparatus is a rotating shaft provided with radial arms which loosen and pulverize the snow which by means of elevators is carried up an inclined plane at the top of which is a platform. This platform, heated by a furnace and also by the exhaust steam from the propelling engine causes the snow to melt rapidly, the water resulting flows through pipes into a receptacle under the heated platform, and is discharged at intervals. Any obstructive matter, such as sticks, stones, etc., being thrown from the platform by devices particularly designed for that function.

A member remarked that, if steam cars were used, the streets could be cleared of snow by exhausting the steam downward. Another suggested that the method of melting the snow from the streets involved only a consideration of expense in fuel. The project was feasible enough, provided the fuel required to produce the necessary heat did not amount to more than it was worth to secure the removal of the snow. Another remarked that, although some difficulty might be experienced from the freezing of the water from the melting snow, yet in most cases the machine would be put to work immediately after the fall of snow before it had become packed or hardened by freezing, and as the weather was comparatively mild about the time of its falling, it would be much more easily disposed of.

J. K. Fisher.—A pound of coal would probably melt about three-fourths of an hundred weight of snow. The most economical way would be to exhaust, downward, the waste steam from the boiler, mingled with the hot products of combustion from the furnace.

The President.—It has been suggested to direct heated currents of air upon the snow; the loss of heat from the air before reaching the snow might, however, render this impracticable.

After some further discussion, "Air Motors and Atmospheric Propulsion," the stated subject before the meeting was taken up; a paper by Mr. Perry Dickson being read by the Secretary of the society.

The writer reviewed the atmospheric propulsion schemes upon which so much money was expended some years since in England. In one of these the principal feature consisted of a pipe or tube extending between the tracks, and fitted with an internal travelling piston connected with the car by a flat stem passing through a longitudinal slot extending the whole length of the tube, and covered by a flap-valve fastened to one side of the slot, so as to be lifted by the stem in its passage and closed down automatically, after such passage by the pressure, the air being exhausted in front of the piston by means of pumps or fans. In another plan, put in operation near London, something more than twenty years ago, a similar principle was involved, the connecting stem passed up through the slot between flat strips of flexible packing attached to each side of the slot in such a way that they formed an arch, the stem, being flat, passed easily between them, while the partial vacuum formed within the tube in front of the piston enabled the pressure of the atmosphere to keep the edges of the packing together in front of the piston, thus enabling the vacuum to be maintained. These plans all proved futile, principally because of the difficulty of permanently preventing the entrance of the air through the long valves of the tubes: but they had the theoretical advantage of doing away with the hauling of heavy propelling apparatus and the like, and the propelling power was applied continuously.

The writer then spoke of the plan involving the use of portable compressed-air tanks arranged on the car and operating the engine thereby. He based his objections to this method principally upon what he believed would be the excessive size of the reservoir required to run the car any considerable distance without re-filling, and stated that, with a pressure of one hundred pounds to the square inch, a reservoir large enough to contain sixteen hundred cubic feet would be necessary to run the car a distance of one mile, some difficulty would be caused by the constantly decreasing pressure in the tanks, and should the air be used at a very high pressure, as some have proposed, the slightest want of accuracy in the pump or other part of the apparatus would occasion great loss of the compressed air. Another great objection would be the loss of time occasioned by charging the tanks at stations.

The system of air tanks attached to the car was deemed hardly less objectionable for many of the same reasons. The writer dismissed caloric engines from the list of practical means of propulsion, because, as he asserted, the power is usually very much overrated, and for the reason that they do not dispense with gases and smoke. The pneumatic tube system he regarded practical and useful for the transportation of small parcels, but very objectionable if used for heavy freight and passengers on account of the loss of power involved in running the car within the tube. After criticizing the proposed use of carbonic acid gas engines for the purpose of propelling cars, Mr. Dickson briefly explained the peculiar features of an invention of his own, which is designed to admit of the reservoir on the car being automatically filled from a pipe laid between the rails the whole length of the road, and charged with compressed air at about one hundred pounds to the square inch by suitable pumping engines connected with the reservoir pipe by branch pipes.

The discussion which followed the reading of the paper was participated in by Messrs. Samuel Carson, A. W. Hall, Robt. Creuzbaur, Wm. B. Harrison, J. K. Fisher and others, and in which much interesting information was brought out concerning atmospheric propulsion in its early stages of progress, and the many difficulties which have to be contended with in perfecting its practical application. Mr. Fisher stated that in a line of road built many years ago between Dublin and Kingston, in Ireland, the imperfect vacuum secured a pressure of about ten pounds to the square inch. The great difficulty in propelling cars by compressed air appeared to consist, for the most part, in the impossibility of running them in quick succession. When air is compressed heat is set free, and the loss by radiation is simply the loss of power, and when air expands after compression it absorbs heat, and thus produces cold. Mr. Creuzbaur stated that, in his opinion, one advantage that might be justly attributed to Mr. Dickson's plan lay in the employment of the air at a moderate pressure. When air was compressed to seven atmospheres, the radiation of heat from it in expanding would reduce its power nearly one-half, and the greater the compression the more the relative loss from this cause.

Mr. Carson stated that he had devoted much attention to the subject for a number of years, and a decade ago had proposed a method of atmospheric propulsion, in which he proposed to use tanks on the cars supplied from stationary reservoirs placed at intervals along the line, and charged with air under compression. One great essential in atmospheric propulsion is to have the air always ready for use at once. To fill a tank of one hundred cubic feet would probably occupy nearly three minutes, while to transfer it from a reservoir to the tank would not necessitate the loss of more than ten seconds of time.

After some miscellaneous business, the President announced that the subject for the next meeting would be "Sewers and Sewerage," whereupon the society adjourned to meet again on Tuesday evening, Oct. 7th.

—During the month of August the bullion yield of the Gold Hill (Nevada) mines is stated at $700,000, being the largest amount ever produced in a single month by the mines of that district.

Correspondence.

Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith —Eds.

A Letter from Italy.

Piacenza, Italy, September 27th, 1868.

Messrs. Editors: In your valuable paper of the 16th of July, I saw an encouragement to send you some items of interest. Often was I willing to answer your invitation; but our life is not so steady as it may be in the New World. Our clime invites to outdoor life—the pure sky and sweet atmosphere impress a desire for promenades or *dolce far niente*. We are surrounded by attractions, and run for pleasure as hard as you do for money. In spite of the heat our theatre was open last month; we had horse races, rifle and pistol shooting, a large fair of fat cattle, also a night fair for sundries, well illuminated by gas. I need not state that our proud stars and stripes were streaming from the windows of my parlor, with a hundred revolving gaslights at night. How is it possible, with such attractions, to remain in the deep arcana of gas-science, in company with smoke, naphtha, sulphur and coal-tar. However, I am coming to some of the subjects you wish for.

While you are discussing to select a city for the first convention of gas men, old Italia has taken the head. We had our first congress in the capital, Firenze, and by unanimous vote we will meet next year in Milano; at each meeting we will vote for the place of the next one, and in this way visit all the chief cities of Italy.

So far, every engineer has his own method. One makes economy of fuel and produces less gas, and *vice versa*; another will keep his retorts for three years, but a third one will prove that there is no economy, as it is obtained at the cost of great loss in the production of gas. It is evident that by comparing the results of the various systems we may find the best one in every department of gas-works.

We generally use kilog. 160 of coke for the distillation of ko. 1000 of Newcastle coal which gives 300 cubic metres of gas, and ko. 660 of marketable coke. Instead of using lime only for purification, the first half of my purifiers is filled with sulphate of iron and the second part with lime: in this way I avoid the formation of napthaline, and consequent obstructions.

When coal tar is not saleable I use it as combustible. The quantity required every 24 hours to heat a bench of seven retorts is ko. 250. coal tar and ko 300 of coke dust agglomerated and pressed with 10 per cent. of coal tar. My benches are of seven retorts, except two sets of four large ones, 60 by 50 centimetres opening, to obtain metallic coke, which I sell to iron foundries. Should you do better in the New World let me know, and I will be happy to follow the good track.

Some other time I will give you more information about gas works in Italy, but I wish to be excused at present, not on acconnt of business; I did work night and day last year to set every department in first rate order, and now every thing goes like a chronometer—very few hours a day are sufficient to wind up the springs and regulate the pendulum.

But shall I confess it? I am ashamed to tell you the truth, however I won't disguise it or lie. I do not close my letter on account of duty, but on account of pleasure. You will exclaim, shocking; this may appear to be so, at a distance of four thousand miles, and if you were on the spot I would like to see how you could resist a hundred pressing invitations to the country, with the prospect of Italian music, Italian grapes, and Italian beauties, under Italian sky. My horse himself grows impatient to get rid of smoke and sulphur, and threatens to start alone for the greens, in spite of two stout firemen who hold him short.

Yours respectfully,

St. A. de Lachomette,
(Formerly of New Orleans),
Superintendent Piacenza Gas Works.

Taxes on Small Gas-Works.*

Tiffin, O., Sept. 22d, 1868.

Messrs. Editors: I felt a little tardy about saying much "to the question" of taxes on small gas-works in my last, for I did not know that the matter had received any consideration. I am much pleased to find it otherwise, and, from the fact, anticipate hearty co-operation.

I have carefully read the papers as you printed them, and think that with slight additions, such as the altered circumstances of our case demand, that they will honestly present the case for Congressional action.

I tender to you, on the part of myself and brethren, our thanks for printing Mr. Coggshall's papers in full, as it must materially facilitate matters, and if you can spare the time necessary to aid us in this matter, we cannot possibly have a better ally.

I would suggest the adoption of the petition drawn up by Mr. C., and if any suggestions can be made that will strengthen our position, let them be made by mail to you, and if, in your judgment, they make the application stronger, insert the same.

When a few weeks shall have given time for such suggestions, and the petition in your judgment be complete, then you can print a few dozen, and one can be circulated in each State for the signatures. The expense of this will be small, and when done can be published in the Journal, and each one who chooses can participate in defraying it, and I will guarantee the payment of any deficiency. I would suggest the insertion of the following clause in the petition:

We would further call your attention to the fact that many of the small gas-works were built, and are now owned and run by individual enterprise, and on these the burthen falls with crushing weight; some of whom can (if your honorable body call for the evidence) satisfy you that they are, and have been, running at a loss, for we would call your attention to the fact, that this is unlike any other business; once begun, it has to be continued; it cannot be removed, and if running at a loss has to go on the prevent greater loss by ceasing to operate. And, further, the late action of Congress in discriminating against, by relieving, all other manufacturers including our great competitor, petroleum, is unjust, unintentional as we believe, but no less unjust.

Yours truly, Machinist.

* This letter should have appeared in our issue of the 16th October, but was mislaid.

Turbinate Force Pump.

New York, October 16, 1868.

Messrs. Editors: Seeing in the American Gas-Light Journal for September 16, 1868, (Vol. 10, No. 6, page 81,) a description of my patent "*Turbinate Force Pump*," patented May 29th, 1866, which was described as the "*Turbinate Centrifugal Pump*," by the Turbinate Pump Company, whose office is at No. 85 Liberty street, New York City, and to whom it was directed that circulars will be furnished on application, I beg the privilege to communicate this letter through your columns, to prevent *infringements and misrepresentations* of said pump to the public.

This pump was patented as the "*Turbinate Force Pump*," on the 29th of May, 1866, and not, as above stated as "*Turbinate Centrifugal Pump*." The sizes of pumps varying in capacity from 150 to 100,000 gallons per minute. The above mentioned Turbinate Pump Company has only the right to manufacture and sell in seven States, viz., *New York* and the six New England States, and *no where else*. The whole interest in the remainder of the United States and territories is owned exclusively by *me* the patentee.

Respectfully,
J. H. A. Gericke,
Office, 25 Montgomery street, Jersey City, N. J.

Smedberg's "Synopsis of Gaslighting."

The following subscriptions to the above work are acknowledged, making in all 201.

James Beveridge, Sup't Newburgh Gas-Light Co.
Bangor Gas-Light Company, Me.
Ithaca " " N. Y.

Fodell's System of Bookkeeping.

The following subscriptions to "Fodell's System of Book-keeping for Gas-Light Companies" have been received, making in all 33:

Ithaca, N. Y., Gas-Light Company.
E. Spencer Miller, Phil. Pa.

—The engine "Pennsylvania," used to push engines on the Reading Railroad, is the largest locomotive in the United States. It has twelve driving-wheels and weighs over forty-four tuns.

To Detect the Presence of Atmospheric Air in Coal Gas.

Dr. T. Werner, at Breslau, recommends for this purpose the use of the following substances: Ten parts by weight of anhydrous sulphate of protoxide of manganese are put into a two-necked Woulf bottle, and then therein dissolved in twenty parts of warm water. To this mixture is immediately added a solution of ten parts by weight of tartrate of potassa and soda (Rochelle salt), dissolved in sixty parts of water; the thorough mixing of the fluids is promoted by well shaking of the bottle; after this there is added a quantity of a solution of caustic potash sufficient to render the fluid quite clear; immediately after this the corks, perforated of course and fitted with very tightly fitting glass tubes, are placed in the necks of the bottle, which should be entirely filled with the mixed fluid just alluded to. One of the glass tubes—the inlet tube for the gas to be tested—should just dip a little under the upper level of the fluid; the outlet tube, on the other hand, should only reach half way the perforation of the cork. A very slow current of gas is now made to pass through the fluid, and kept going for at least quarter and at most one full hour. In case the gas is quite free from atmospheric air, the fluid in the bottle will remain quite clear; if traces even of air are present a faint coloration of the liquid will soon become apparent; with a larger proportion of air present in the gas the fluid will soon be rendered first light brown colored and afterwards intensely black. Since these changes of color are due to the oxidation of the salt of manganese, it is evident that every care must be taken to avoid the presence of access of accidental air; the fluid in the Woulf bottle should reach the cork. It is best to cool the bottle during the experiment with ice, if at hand, otherwise with very cold water; the current of gas must be slow.—*Pharmaceutische Zeitschrift fud Russland*,1868.

Compressed Air for Propelling Street Cars.

New Orleans seems to be taking the lead in devising new methods for propelling street cars. Mr. Waylis, of that city, has recently invented a car which is said to have proved a complete success. In the car station there is an ordinary steam engine of about sixty-six horse power for compressing air into reservoirs, which are made of a paper composition, and two of them are placed on top of the cars. On each car there is a small engine operated by air supplied from the reservoir in the same manner as steam, giving the exact amount of power that was required to compress the air. The engine is not difficult to run, and the cars can be stopped much more readily than when horses are used. Each car will have 300 pounds of compressed air to start with, which will be sufficient to run it nine or ten miles. The exhausted air, as it escapes from the engine, may be used for ventilation. In New Orleans there are five thousand mules and in New York forty thousand horses, said to be employed on the various railway lines. By this method of compressed air, they will be superseded, as it is cheaper, and at the same time, less wearing to the conscience of riding humanity. We hope to see it adopted in this city.

Patents Issued.—During the week ending October 6, 1868, the following patents were issued: Slat matting for cars, etc., Wm. Barton, Troy, N. Y.; car coupling, H. C. Glasgow, Cleveland, Ohio; furnace door, Luman F. Johnson, Buffalo, N. Y.; railway rail joint, E. G. Patterson, Pithole City, Pa.; quicksilver feeder for quartz mills, John Pattison, Nevada, Cal.; express signal, Chas. H. Seawell, St. Louis, Mo.; propelling apparatus, E. S. Barnes, Nebraska City, Neb.; railway car coupling, R. A. Cowell, Cleveland, Ohio; railway car heater, Isaac Dripps, Fort Wayne, Ind.; machine for grinding and polishing school slates, Stiness Hagamon, Weissport, Pa.. signal flag for vessels, John F. H. King, Port Richmond, N. Y.; machine for working iron, Jacob Reese, Pittsburg, Pa.; process of electro-plating with nickel, Wm. H. Remington, Boston, Mass.; lubricator, David M. Reynolds, Port Deposit, Md.; railroad rail, Edwin R. Shepard, Scranton, Pa.; railroad car heating apparatus, Thomas Smith and John O. Reilly, Baltimore, Md.; canal boats and other vessels for the transportation of grain, Dan. E. Somes, Washington, D. C.; railway car seat, F. F. Wagner, Harrisburg, Pa.

Answers to Correspondents.

W. O. B., of Me.—There is no book such as you want. Clegg and Peckston are the best authors on gas. A concise and well written book on this subject is much needed.

A. L. O., of Ky.—Croll appears to have been the first to adopt the practice of using the coke red hot as it is taken from the retort. By this means a saving of 10 per cent. of fuel is effected.

L. E. P., of Mass.—Hughes' work is well adapted to your wants, and will give you a large amount of practical information. It can be had of D. Van Nostrand, 192 Broadway, N. Y.

B. H., of Ky.—Your remarks are noted and will be attended to. In the meantime we advise a repetition of your experiments, for we are inclined to believe you are wrong in your deductions.

A. C., of Ohio.—Mr. Grafton was the first to introduce clay retorts. Clegg will give you the full information; or if you cannot procure a copy of this work, Hughes will answer.

B. W., of Ill.—Generally there is more sulphur in cannel than in other bituminous gas coals. Consequently cannel gas requires rather more attention in the purifying house than that made from ordinary caking coal. There are exceptions to this rule but, broadly speaking, it may be named as correct.

T. H., of Mass.—You will find the address of the makers and agents of the best clay retorts in our advertising index. They will furnish you with full directions how to set them. We think you are making a move in the right direction.

F. B. C., of Ind.—It is altogether a question of economy. The expense of altering the works we should think would not be much. You will find the address of several parties in our advertising index, who will give you all the information required.

A Novel Invention.—A novel invention of considerable merit, introduced a few weeks since among our financial houses on Wall and Broad streets, is working quite a revolution in business customs. Heretofore stock houses have employed boys to run to and fro to the Gold Room for the quotations, every variation of a fraction being immediately reported. Now, however, by means of a piano-board telegraph, if that be its name, the quotations are simultaneously made known in a hundred different offices. You go into a broker's office, and upon hearing a little noise on the wall, look up, and figures appear telling the price of gold to a fraction at that moment in the Gold Room. In five minutes more, perhaps another fractional figure will appear, indicating another variation in the price, and so on. An operator sits in the Gold Room and touches keys on a board; attached to these keys are wires connecting with the brokers' offices. Every key denotes a figure or a fraction of a figure. Attached to the ends of the wires in the various offices are little revolving arrangements which slide out or drop down figures corresponding with the numbers of the keys touched. The vice president of the Gold Room, it is said, invented this labor-saving contrivance, which is soon to report the price of stocks in the same manner. It is said he is to receive $25,000 annually from the hundred offices which have introduced his invention. Its use will do away with the employment of a whole regiment of boys.—*Exchange.*

Discovery of Gold Fields in South Africa.—Intellence reaches us that gold has been found pretty extensively in South Africa, between 17 and 21½ deg. south latitude, and about 400 miles distant from Preroria, the nearest point of civilization, in the South African Republic of Transvaal. The kingdom of Sofala, situated on the coast to the eastward of the alleged gold formation, has heretofore been considered to be the *Ophir* of King Solomon's time. Messrs. Hartley and Mauch—the former an old elephant hunter, the latter an emissary of a Berlin Scientific Society—report that the gold is found in quartz veins, and that the fields are of vast extent. The natives are known from old times to have brought gold to the Portuguese in quills. They are said to light big fires to loosen the rock containing visible gold, and then further disintegrate it with their "mashetes."

"A SCOT STILL—I crave no higher name."—BURNS.

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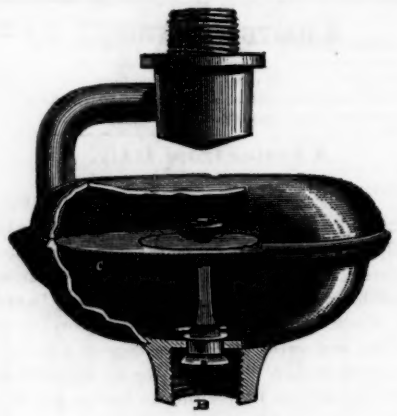

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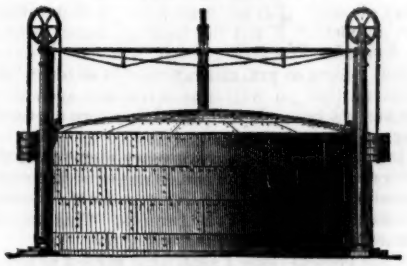

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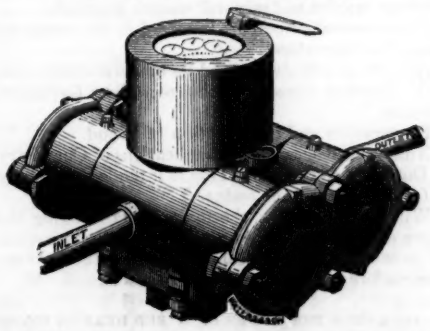

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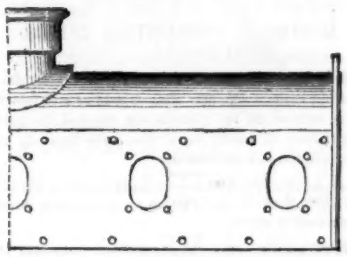

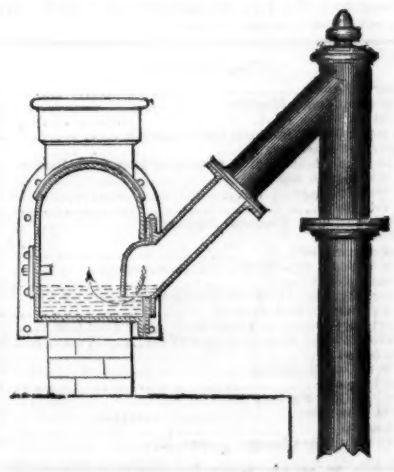

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[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

MONDAY, NOVEMBER 2, 1868.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

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GAS IN CANTON.

Messrs. Barnes, Davis & Co., Gas Engineers and Contractors, doing business in Boston and this city, have lately contracted to erect gas-works at Canton, in the Empire of China. The main building for retorts, etc., will be 184 feet long, made of iron, and constructed after the most approved plans. There will be 24 benches of 5 retorts in a bench, 120 retorts in all, and the works will have a capacity to make 500,000 cubic feet per 24 hours. Thirty miles of gas main will be laid, ranging from 12 inches in diameter downward. All the materials for the buildings, gasholder and works will be made and fitted here, and shipped complete, ready to be put up immediately on their arrival at their destination.

This enterprising contracting firm, who have their works at Waltham, Mass., are to receive one million dollars in gold, or rather in Mexican dollars for the works, and they estimate to have them completed in six months from the commencement. This is one of the immediate evidences that the visits of the Celestials to our shores will be beneficial to the commercial industry of our country, and, in this instance at least, will assist to the enlightment of the former.

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Chemical Repertory.

Under this head it is my purpose to lay the foundation of what, I trust, may grow in time into a most important, if not the leading, department of this Journal. The arrangement, however, is so extremely recent as yet, and my time is so much preoccupied, that no well-considered and systematic plan has yet been adopted, and I therefore deprecate criticism for a season.

Time, indeed, will be a necessary element in the erection of this, as of any edifice intended to be substantial and enduring. In this case I hope to enlist the assistance of American chemists. This may be an ambitious hope, but time will show.

In the present issue I shall limit myself as a preliminary to the presentation of some items of scientific intelligence, mainly digested and translated (at random) from recent scientific journals.

Let me but add that I shall most cheerfully offer explanations and reply to questions on chemical points, addressed to me at this office; and that I solicit all such. HENRY WURTZ.

ARTICLES are in preparation, some in a condition of forwardness, conveying information, in most cases of a comprehensive kind, in relation to numerous scientific topics of the day; such, for example, as:

The different methods for the manufacture, on a scale, of Oxygen Gas.

The subjects of Ventilation and Heating of Buildings, from a scientific point of view.

The use of Gas for heating and as a motive power.

The use of Petroleum for the same purposes.

The chemical examination and purification of drinking waters and mineral waters generally.

The chemical principles involved in the construction of Refrigerators.

History of gunpowder and its modern substitutes, with chemical considerations regarding Explosive Agents.

Preparation and preservation of Wood.

Numerous discussions of applications of Chemistry in DOMESTIC ECONOMY. [This is intended especially to form an important feature.]

With many others; the main object in citing the above examples being to demonstrate the unbounded, as well as the practical, character of the field we place before us. H. W.

1. NOTE UPON THE ACTION OF A RED HEAT ON OIL OF TURPENTINE.

BY HLASIWETZ AND HINTERBERGER.

This investigation, translated from the proceedings of the Vienna Academy, appears to possess interest and suggestiveness; especially for American chemists, since the overthrow of the Southern Rebellion has led to the renewed introduction of oil of turpentine into our markets at prices surprisingly low. Although the results here presented do not develop any practical applications of an obvious kind, yet it may be doubted whether any field more richly pregnant of results of economical value presents itself to-day to competent chemists, than investigations of the products of various chemical treatments of oil of turpentine and common rosin.

The authors passed vapors of turpentine through a red-hot iron tube filled with fragments of porcelain. The products were a gas, some carbon (as a mirror-like black crust on the porcelain) and considerable dark brown oily liquid of benzole-like odor, lighter than water. The gas burnt like illuminating gas. One hundred measures of turpentine gave on an average 60 of liquid, and about 16,800 of gas (specific gravity not given); and the carbon (as I estimate from their figures) amounted to about 2.3 per cent. of the material employed. The brown liquid, distilled with water, gave 81 volumes per 100 of a gold-yellow oil of a much purer and pleasanter smell than before, and a tarry residuum. This rectified product was nearly one-half (in volume), of the turpentine employed. It was dried by fused chloride of calcium, and subjected to fractional distillation; when 1000 volumes yielded, at the temperatures indicated (these temperatures are Centigrade, and may be converted to Fahrenheit by the well known rule—multiply by 9, divide by 5, and and add 32):

100	vols.	at	107–130°	150	vols.	at	160–170°
50	"	"	130–135°	90	"	"	170–180°
70	"	"	135–140°	50	"	"	180–190°
90	"	"	140–145°	40	"	"	190–200°
100	"	"	145–150°	40	"	"	Resid'm.
220	"	"	150–160°				

Each of these yellowish-colored fractions was again distilled fractionally by itself, and the liquids thus obtained up to 110° (230° F.) were colorless, and those from 110–200° (230–392° F.) were light yellow. The new fractions were taken at temperatures rising by steps of 5°. The first of them now distilled over as low down as 60° (140° F.); it was the smallest in quantity. The higher fractions increased in quantity up to 140°; between which and 160° the greatest part distilled. At 200° a small red-brown residuum remained in the retort. The fraction between 60° and 70° gave on analysis a composition corresponding to the formula, $C^{10}H^8$, thus coming nearest to an isomere of oil of turpentine. (The boiling-point of pure oil of turpentine is set down in the books as about 160° C.) Nevertheless a new fractional distillation of this portion gave first a colorless, very volatile liquid, which began to boil feebly as low as 30°. In this last distillation was observed the remarkable phenomenon, that a sudden decomposition always sets in when about two thirds of the liquid had distilled over. Without further heating, the temperature then elevated itself to 130°, the liquid began to boil strongly, turned yellow, and then exploded! The result of the explosion is a red-yellow liquid in the receiver, and a red thickish mass left in the retort. During the decomposition a mass of white vapors is evolved, which affect the mucous membrane of the eyes and throat like those of aldehyde. If the crude products of the decomposition be washed with water, the latter acquires an acid reaction, and the power of reducing silver-solutions with ease. The part insoluble in water dissolves easily in alcohol, and colors the skin a permanent orange-red.

It is thus apparent that the decomposition by heat of oil of turpentine engenders a whole series of hydrocarbons, whose separation may be expected to be difficult and tedious. The authors present the above, therefore, only as a preliminary notice, to indicate that they are now occupied with a fuller investigation, the result of which they reserve for a future more detailed communication. They announce however, that most of the products are readily nitrated and brominized.

It is a pity that H. and H. have told us nothing of the qualities of these new products as *solvents*. Chemists will agree in the importance, for many purposes in the arts of the present day, of finding some liquid, cheap and obtainable in any abundance, which will vie in solvent power and volatility with the rather expensive benzole (that is, true coal-tar benzole, not the common cheap petroleum-naphtha or "benzine," which is almost universally confounded in commerce with benzole), and that still more expensive, but noble solvent, chloroform. The results of DEVILLE'S investigations of the chlorinated species of oil of turpentine do not indicate any probability of success in that direction; all the products being unstable, and decomposed with separation of carbon by mere evaporation. We may reasonably entertain the hope that the further investigaion, above promised us, may lead in this direction.

H. W.

2. APPLICATION OF PLATINUM IN THE QUICK VINEGAR-PROCESS.

ARTUS, in his *Vierteljahresschrift*, recommends to dissolve one half ounce of dry *Bichloride of Platinum* in 5 lbs. *Alcohol*, saturate therewith 3 lbs. of wood-charcoal, broken to the bigness of a hazel-nut, and ignite in a covered crucible; and to use the product in the well-known way in the oxydation of alcohol to acetic acid. He states its action to be surprisingly rapid and complete, and that the vinegar obtained has a pleasant flavor and odor. This seems an improvement of sufficient practical promise to be worthy of record.

H. W.

3. GAS MADE FROM PETROLEUM-RESIDUES.

We have heard much in this country of late of attempts to introduce the Petroleum-Residues as a material in Gas Making. It appears that similar experiments have been in progress in Austria. SCHROETTER recently communicated to the *Journal für praktische Chemie* (*Band* cii., p. 59) an analysis made by F. REIM of such gas, made by the "process of HIRZEL." The results were, in 100 volumes, 17.4 vols. Ethylene (Olefiant Gas) 58.3 Marsh Gas, and 24.3 Hydrogen. (In a note in the *Chemisches Centralblatt*, the curious comment is made upon this analysis that similar gas analysed in the laboratory of ERDMANN was found rich in Acetylene!). The density of the gas is not given, but it is stated that its illuminating power was *three times as high* as that of ordinary coal-gas; which is about as much as to say that a certain thing is "as big as a piece of chalk." Of the gas of the "English Company," of

Vienna, it was found that whilst a given volume required for complete combustion 1 volume of air and gave thereby 1 volume of CO^2 and 1 volume of H O; such a volume of petroleum gas as yielded the same amount of light, required for complete combustion only 0.546 volume of air, and gave but 0.548 vol. CO^2 and 0.341 vol. H O. The residual nitrogen also, in the two cases, stood in like proportion. On the other hand, the *heating-power* of volumes of equal lighting-power, of the coal and petroleum gases, was as three of the former to one of the latter.

Whereupon the inventor, HIRZEL himself, not satisfied with the above remarkable results, demurs to them in the *Zeitschrift für Chemie* (vol. 3, p. 617). He asserts that the gas analysed by REIM was prepared from very poor black residuum of East Galician petroleum; and that gas made in his apparatus from good dark-green residuum of Pennsylvania petroleum possesses according to careful photometric measurement made in different places, at least *four times, usually five times*, as great a lighting-power, as ordinary coal-gas. With regard to REIM'S analysis he also entertains doubts, on the ground that his gas possesses a density of 0.7 to 0.8; and therefore that it cannot be so poor in olefiant, and so rich in marsh-gas and hydrogen as REIM indicates.

[With regard to the strictures of HIRZEL, I would remark that, if it is true, as stated, that this gas is extraordinarily rich in acetylene; which, if true, has escaped REIM; as the density of acetylene is about 0.9, it might account for the high density, or render it compatible with a considerable content of lighter gases. I am at a loss to understand, however, supposing the samples analysed to have been properly *washed*, as in the practical manufacture of gas, how any considerable proportion of acetylene could be retained, as this is well known to be appreciably soluble in water, and is chiefly removed during the washing from ordinary gas. It has probably been assumed that the gas from the petroleum residues would require no washing; a point requiring further elucidation. The unpleasant odor of acetylene would not be in favor of such gas, if it forms a large constituent.—H. W.]

CHEMICAL *EXCERPTA.*

Under this head I purpose to gather in the most *condensed* form practicable, from such recent Scientific Journals; both at home and abroad; as come under my eyes, the substance of such articles as seem deserving thereof. In this work, I shall not, as might be thought, hold myself confined to novel facts alone; regarding new hypotheses, and even speculations, when involving labor and ingenuity in the *generalization* of facts, as even more valuable to Science. It is hardly necessary to add that in my own comments, to which a degree of personal responsibility attaches, a less condensed style will be inevitable. HENRY WURTZ.

[*Journal of Franklin Institute for October*, 1868.]

——A newly invented stopper, of high simplicity, by Mr. JOHN MATTHEWS, of New York; for bottles of soda water, or other liquids under tension. A solid short glass cylinder slides freely through the throat of the bottle, upon whose lower end there is an elastic rubber collar, larger, when expanded, than the throat. The tension within keeps the stopper tight. A blow will detach the rubber collar and drive down the stopper, and the bottle may be emptied, or a part of the liquid preserved by simple inversion, which will fix the stopper again.

——Mr. GWYNNE, of Centrifugal Pump fame, has pointed out to the British Association that these pumps should have:—

First—Perfect uniformity of cross section in all passages and connections; and Second—no abrupt changes of direction of current. Experiments have shown not only contractions (which all would anticipate) to be detrimental, but *expansions also*; thus, a pipe discharging 4 cubic feet, in 109 seconds; with one enlargement required 147 seconds; with three, 192 seconds; and with five, 250 seconds.

——*Dynamite.*—It would appear that NOBEL has at length informed the British Association that dynamite is nitroglycerine mixed to the consistence of "tempered clay," with "one fourth of its bulk of porous silica." Whether infusorial silica, or artificially precipitated, or other form, does not appear.

[With this far from definite information we must, I suppose, rest content for the present. The security attained is said to be prevention of *leakage*; which is thought impossible to prevent with the liquid. As, however, even from tempered clay, containing anything like ⅔ths, or even half of its bulk of water, the latter would in time partially separate in a closed vessel; and especially as in nitroglycerine we have a material like *oils*, like petroleum for example, which has in a high degree the propensity popularly called "soakage," and that of expanding and creeping over surfaces. I do not see but that further light is necessary to inspire much confidence in these new devices. I add that no one would hail the success of M. NOBEL in this enterprise with more sympathetic satisfaction than myself. His persistance, in the face of such tremendous obstacles and discouragements as have beset him; furnishes one of the most remarkable examples of scientific intrepidity, so to speak, on record.

As to the results related; to show the harmlessness of dynamite, such as throwing it down a precipice; putting it on a fire, etc., everybody will recollect that the same statements were made about the liquid nitroglycerine itself. Nitroglycerine, I would here say, belongs to a well-characterized class of Explosive Agents or Compounds, of which common gunpowder is a member (and fulminates are not members) which seem to require an *internal* molecular disturbance to excite explosion, and are not affected with certainty by *external* mechanical force. Their mode of explosion may be compared to an immensely rapid and intense fermentation (in fact we have explosive fermentation). The well-known fact that gunpowder cannot explode *in vacuo* may be brought under this view. It is generally attributed merely to absence of the *confinement* arising from atmospheric pressure. I shall, however, allude to some very curious observations of my own; made many years since; in an extensive investigation of the subject of explosive agents, but never before published, to show that there is more in question than mere atmospheric pressure. A handful of granulated gunpowder, which if flashed in the open air goes off with a just perceptible noise and occupies a just perceptible time in burning, will, as is well known, burn far more slowly if moistened and reduced by a slight pressure to a solid mass. Even if gum water be used and the mass be dried, it still burns like a squib. The same occurs even if the agglutination be effected by an alcoholic solution of shellac, which is incapable of disintegrating or penetrating the grains. Far otherwise, if *collodion* be used to effect the conglomeration. The mass then goes off *instantaneously* as if enclosed in a wrapper and with a bang like a fire-cracker! This being a subject which I shall recur to *in extenso* in these columns (as already promised) at a future day, I forbear for the present.—H. W.]

——The statement is quoted from *Engineering* that the watering of roads with *deliquescent salts* has been practiced "with excellent success in London, during the summer-months. Along Baker street, Portman Square, where the experiment was tried, it had given the greatest satisfaction to all the residents; and even on Sundays, when all watering of streets was discontinued, this locality enjoyed a clear atmosphere, while the neighboring thoroughfares were clouded with dust."

[This is an ancient idea, proposed, and even tried, repeatedly before, and probably covered by divers patents. It is presumed that the solution employed was one of *chloride of calcium*. It would be a not-unimportant subject of congratulation if this salt could be successfully utilized in this way, as vast quantities of it now run to waste; and not only would the profits of many manufactures be augmented, but many new processes could be made profitable, of which chloride of calcium, now worthless, forms a large collateral product. It is not difficult to suggest objections; such as the fact that solutions of this salt excite powerfully the oxidation and rusting of iron, the material of the shoes of the horses, the tires of the wheels, etc.; but the same source that furnishes such objections could produce the appropriate remedies.—H. W.]

——From the same journal, a report is quoted that large Works had actually been erected in London for bleaching sugar by *Ozone*, of electric origin, Wilde's machine being used; and that the process, successful to a marked degree in the laboratory, had failed from unknown causes (?) on a commercial scale. A comparison is suggested with the similar *wild* and premature experiment of the great "Air-Ship," fifteen years since, on a principle which has since been found so admirably adaptable on a smaller scale, and is in use throughout the world.

——Next we have an intelligent and instructive letter from New York, signed A. P. B., on Fire-proof Buildings. I condense a few sentences, big with truth and import: "A building (*iron* buildings referred to) may be fire-proof, and yet not indestructible. For example, it may be filled with combustibles which when burning will so unequally strain the iron supports and flooring that they must yield and carry everything to destruction; especially if of cast-iron, which when overheated becomes as brittle as glass, and moreover shivers like glass when water is thrown on it. Any fire-proof building, intended for storage, should be, as far as possible, of wrought-iron, which stands far greater heat than cast, before losing its strength. In fact it may be said that 'no iron building is fire-proof simply because it is of iron.'"

[As this is one of the most important of the subjects which I propose *soon* to take up and discuss, I defer much I have to say in connection.—H. W.]

——[*Puddling.*—It has usually been assumed that in a puddling furnace, the current of air over the hearth is at least somewhat concerned in the oxidation and removal of the impurities of the iron, but SIEMENS asserts to the British Association, that by an experiment in which he employed a "perfectly neutral flame," (meaning one with no excess of free oxygen), he found that "not only did the process advance as well as before, but that the weight of wrought-iron produced was fully equal to the pig employed," and claims that thereby he has proved that not only is some of the *fettling* (oxide of iron introduced to form a slag) reduced by the carbon, etc., of the iron, but that the purifying agent is solely *the oxygen of the fettling itself*. The agencies of carbonic oxide and watery vapor, however, may probably interfere with the hypothetical scheme of Mr. SIEMENS.—H. W.]

[*The Chemical News, of Sept. 25th*, 1868, *No.* 460.]

Prof. WANKLYN, of the London Institution, on the "Action of Na on Formic Ether." LOEWIG & WEIDEMANN state in the *Journal für praktische Chemie*, 1840, vol. xx., that Na in formiate of ethyle evolves a gas which is given off *from the whole body of the liquid*, and not from the surface of the Na alone, which gas was found to be pure CO; alcohol and ethylate of soda being formed. L. & W. infer a kind of *catalytic* action of the Na, splitting up the formic acid as follows:

$$C^4 H^6 O, C^2 HO^3 = C^4 H^6 O^2 + 2CO.*$$

E. GRINER, (*Jahresbericht* for 1866, p. 300), in view of the anomalies here presented; of alcohol and Na being in contact, without the usual evolution of H, and formation of ethylate of soda; has reinvestigated the subject and asserts that free H *is* actually produced. WANKLYN now confirms the original results of L. & W., finding that "no free H results from the action of Na on formic ether." He has shown also that "one equivalent of Na will liberate more than 3 molecules of CO," and that the alkali-metal really acts in a catalytic way, that is, by *its mere presence*, and upon indefinite quantities of formic ether. Also that ethylate of soda *alone* is capable of resolving formic ether into alcohol and CO; thus accounting simply for the extraordinary evolution of this latter gas from all parts of the liquid. Also, by further direct experiments, that the mere presence of formic ether prevents the evolution of H from alcohol by Na. WANKLYN supposes that besides ethylate of soda, in the first stage of the reaction there is formed *Sodium-tri-formyle.*

$$3(C^6 H^6 O^4) + Na^4 = \left\{ \begin{matrix} Na \\ (C^2 HO^2)^6 \end{matrix} \right\} + 3 \left\{ \begin{matrix} C^4 H^5 \\ Na \end{matrix} \right\} O^2$$

Sodium-tri-formyle. Ethytate of Soda.

and that this splits up into methylate of soda and CO.

$$\left\{ \begin{matrix} (C^2 HO^2)^3 \\ Na \end{matrix} \right\} = 4CO + \left\{ \begin{matrix} C^2 H^3 \\ Na \end{matrix} \right\} O^2$$

but promises further experimental data on these points.

WANKLYN further claims that in a paper presented by him to the Chemical Society in 1864, but *suppressed by the Council*, he explained ETTLING'S strange but well known production of carbonic ether and CO from oxalic ether and Na; and deduced from his views that ethylate of soda and oxalic ether would give CO and carbonic ether; a deduction which he points out has been recently completely verified by DITTMAR, though in ignorance of his own previous views. The case of ethylate of soda and formic ether is parallel with that of ethylate of soda and oxalic ether.

——ELLER and WICHELHAUS have stated to the Chemical Society at Berlin, that the supposed artificial succinic acid obtained by the action of KCy on chlorpropionic acid; fuses at 129.5°; dissolves in five parts of water at the ordinary temperature its potash salt gives no precipitate with ferric chloride. [Succinic acid from amber (according to LOEWIG'S *Chemie der organischen Verbindungen*, vol. 2,577) fuses at 175-180°, and dissolves in three parts of cold water. The precipitation of ferric solutions by ordinary succinate of potash is a familiar fact.—H. W.]

* It will be observed that I, for the present, adopt the practice of translating the improved (?) fashions of Notation now employed by the *Chemical News* and some other journals, into the formulation still most familiar to American readers. Even if the superiority of the new systems be admitted, the majority of our readers are as yet more confused and discouraged than benefitted by the burden of constant mental *translation*, as from a foreign tongue. —H. W.

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☞ *For new advertisements and "Answers to Correspondents," see page* 134.

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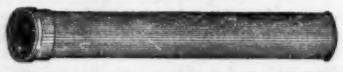

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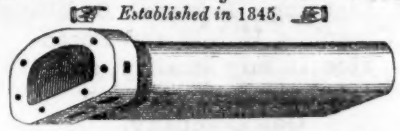

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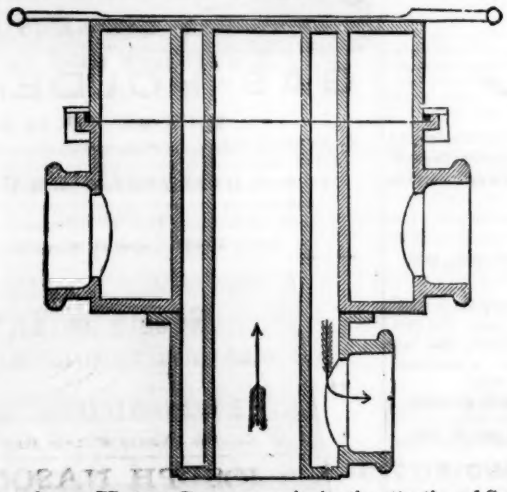

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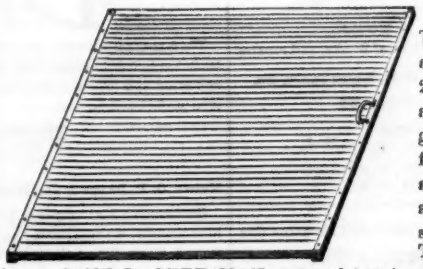

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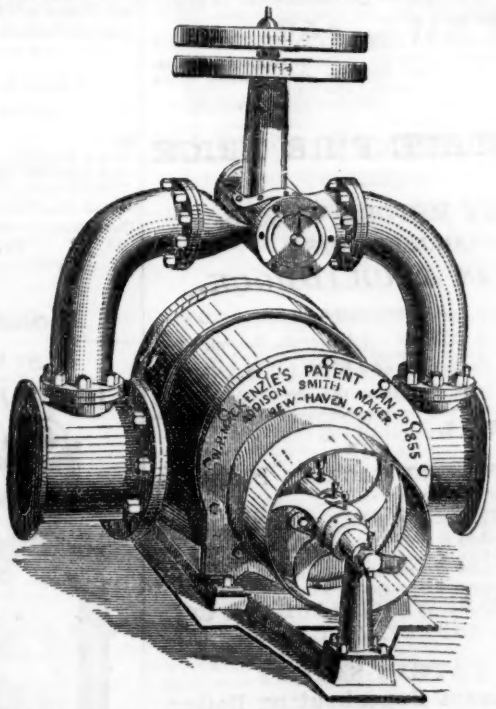

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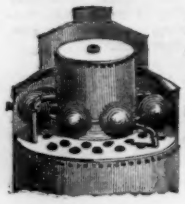

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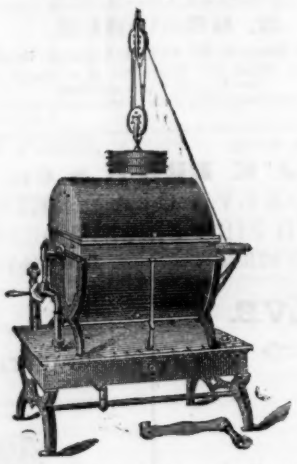

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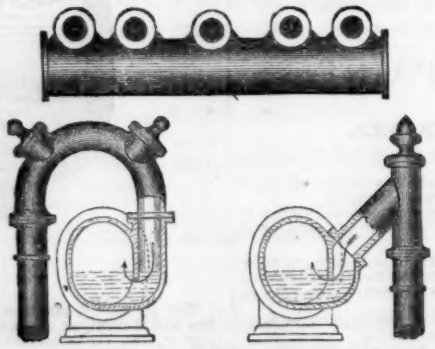

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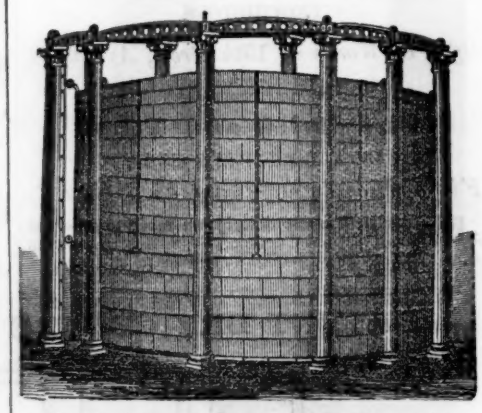

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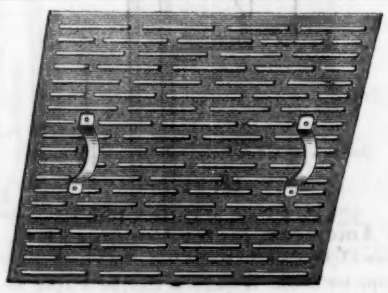

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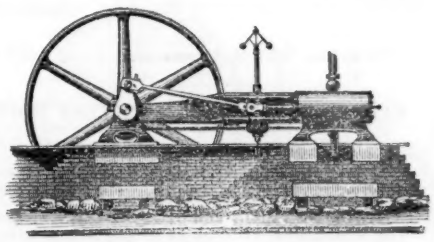

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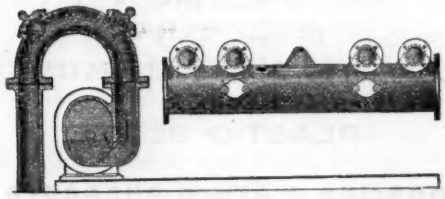

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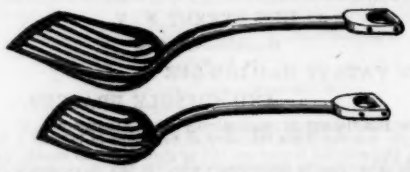

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New Family

SEWING MACHINE

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To accomplish this at once and save the expense of a *Travelling Agent*, we offer thus, viz:

Any one sending us orders for two machines shall receive one machine free of charge. This proposition cannot avail after we have appointed a local agent in the town.

We have now completed our *new manufacture* at a cost of some $200,000—introducing *new patents*, and such important improvements, that without fear we are able to offer the following stringent guarantee, viz: After a fair trial, if any purchaser does not prefer the FINKLE & LYON FAMILY SEWING MACHINE to any other, he can return it and have back his money.

This machine has taken many of the HIGHEST PRIZES; *is less complicated than any other first class machine; does a wider range of work without changing; requires no taking apart to clean or oil, no "lessons" to set needle, regulate tension or operate machine.*

Our new Manufacturing Machine is sold on the same terms as the Family Machine.

Please send for a circular with samples of sewing.

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LOUISVILLE PIPE WORKS,

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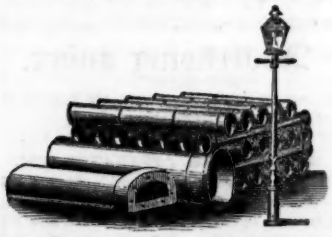

Cast Iron Gas and Water Pipe of All Sizes Always on Hand.

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All Pipe, &c., Made of the Very Latest Pattern and Improvements.

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NEW SYSTEM OF

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Every Saturday, the elegant Side-Wheel Steamships

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Every SATURDAY, from pier 13 North River.

Have been placed on the route to Savannah by the Atlantic Mail Steamship Company of New York, and are intended to be run by them in a manner to meet the first class requirements of the trade. The cabin accommodations of these ships are not excelled by any Steamers on the coast, and although their carrying capacity is large, their draught of water enables them to insure passage without detention in the river

San Jacinto,	Saturday,	Oct. 6
San Salvador,	..	" 13
San Jacinto,	..	" 20
San Salvador,		" 27
San Jacinto	Saturday,	Nov. 3
San Salvador	..	" 10
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Warerooms Nos. 644 & 646 Broadway, N. Y.

Manufacturers of Piano Fortes, with their Patent

Combination Sounding-boards,

PATENTED AUGUST 14th, 1866

This invention, introduced exclusively into our Pianos, is of the greatest advantage to the tone of the Instrument, as it affects the sounding-board, the very soul of the Piano, and produces thereby a pure liquid tone greatly superior in quality and power to that of the ordinary Piano. The sounding-board released from its connection with the Piano case, and resting upon under sounding-boards, is relieved from the rigidity caused by such connection, and its vibratory quality increased. Our Pianos are first class in every respect, and purchasers will have not only our own guarantee as to their quality, but also the guarantee of the reputation of the instrument, obtained from the experience of our patrons who have used them for a generation. All lovers of this eminently household instrument, as well as parties proposing to purchasenew Pianos, are invited to call and examine our assortment. 96-1y

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BRACKETS, 1, 2, & 3 Lights.

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☞ Can be lighted as quickly as Gas, Filled, Trimmed safely and neatly, without removing the Shade, Globe or Chimney, or unscrewing the burner.

We make a specialty of furnishing

SAFE STATIONARY LIGHTS

in place of those that are movable and dangerous, and

PURE NON-EXPLOSIVE OIL

in place of the unsafe adulterated stuff so often used by careless and ignorant persons.

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TUBES,

For Steam, Water, or Gas.

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ALSO

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Miner's Patent Street Lamp.

This is a marked improvement upon, and far superior to the ancient styles of rickety street lamps, with their rattling, leaking, and semi-opaque panes. It consists of an inverted glass dome suspended by its upper flange, which rests upon an enamelled metallic frame, surmounted by an ornamental enameled hinged cone or cap. The enameled frame first mentioned is sus-

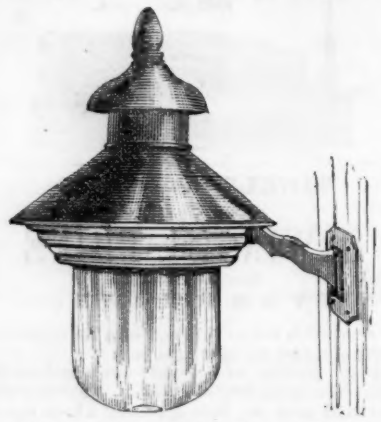
[*Post Lamp for Lighting Streets. These are also made with brackets, to fasten on the wall.*]

tained by four small iron rods, which pass down and are bolted to the top of the lamp post. So little or no light is obstructed thereby. The bottom of the inverted glass dome has an aperture of aobut two inches diameter to admit the gas tube and burner, and also to permit of lighting the same.

[*Hanging Lamp for Depots, Markets, Stables, etc.*]

The hinged cone or cap is to facilitate cleaning the lamp, and also to light it if required from the top. The projecting part of the enameled frame and cap is a good reflector, and serves to throw the light to a greater distance, while it at the same time protects the glass from the drip and stain of rain and the weather.

This style of lamp is also neatly arranged as a hanging lamp or as a bracket for depots, markets, stables, courts, etc. In a few words, they are more tasteful and ornamental, give a better light, are more easily kept clean, are cheaper and more durable than anything of the kind we have ever seen. We understand they are becoming very popular, and very justly so.



[*Bracket Lamp for fastening on Walls.*]

Messrs. E. A. Heath & Co. are sole manufacturers for the United States, and have their office at 400 West 15th street, and salesroom at 44 Murray street.

See advertisement in our next issue.

—Another confirmation of coal from the Laramie Plains! The Cheyenne *Leader* says that while grading the railroad near Rock Creek, a cut was made through a vein of the finest quality of bituminous coal; and no seam either, but a good eight-foot vein. It cannot be long before all the coal needed on the Pacific road will be found along its route. We shall hear of some marvelous discovery from the Alkalf Desert and Death's Valley some of these days, when pioneers are found bold enough to look for anything there that is not in immediate sight.

Advertising Index.

☞ In looking for advertisements, see figures 1 to 9, within brackets, at head of advertisement pages.

GAS-BURNERS, APPARATUS ETC.

Arnold's Metallic Gas Trays—T. G. Arnold, 334 and 336 West 21st street, N. Y. 6
American Meter Company, 512 West 22d street, New York. 8
Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the American Gas-Light Journal. 2
Builder of Gas Works, Apparatus, Etc.—P. P. Deily, 39 Laurel street, Philadelphia. 6
Begg's Lamp Regulator—Office Gas-Light Journal, 22 Pine st. 3
Cambridge Gas Stoves, Ranges, &c.—Gas Light Journal Offices, 8
Contractors for Gas- , Etc.—Murray, Baker & Walker, Fort Wayne, Ind. 2
Gas Fixtures, Etc.—Archer & Pancoast Manufacturing Co., 9, 11 and 13 Mercer street, New York. 3
Gas Fitters' and Plumbers' Materials—McNab & Harlin, 86 John street, New York. 3
Gas Coals—Bird, Perkins & Job, 104 Wall street, New York. 4
Gas Engineers and Contractors—Hoy, Kennedy & Co., 111 Liberty street, New York. 4
Gas-Burners—C. Gefrorer, 529 Commerce street, Philadelphia, Pa. 9
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry street, Philadelphia, Pa. 8
Gas Superintendent—C. M. Cresson, 417 Walnut st., Phil., Pa. 9
Gas Apparatus, &c.—Geo. H. Kitchen & Co., 561 Broadway. 9
Gas Burners—Wightman Bros., 25 Kilby st., Boston, Mass. 9
Gas Burners—T. G. Arnold, 224 and 226 West 21st st., N. Y. 9
Gas Burners—W. Anderson, cor Franklin & Elm sts., N. Y. 8
Gas Works for Sale—Colonel J. A. Sabbaton, Manhattan Gas Works, N. Y. 8
Gas Stoves—A. L. Bogart, 792 Broadway 7
Gas Fixtures, Meters, Etc., Etc.,—McHenry & Carson, Cincinnati, Ohio. 4
Gas Fixtures & Chandeliers—Alfred Bliss & Co., 95 Bleecker-st., New York. 2
Gasometers, Etc—George Stacey & Co. Cincinnati, O. 6
Gas-works of London—D. Van Nostraud, 192 Broadway. 8
Plumbers, Gas and Steam Fitters—Moore & Gaussen, 221 West Fifth street, Cincinnati, O. 6
Patent Gas Exhauster—Smith & Sayre, 484 Broadway. 5
Purifying Trays—Jno. L Cheeseman, 147 and 149 Ave. C, N.Y. 2
Robbins' Patent Joint for Gas and Water Pipes. 4
Solar Gas Machines—W. S. Drake, 18 Dey street. 6
Stanley's Hydraulic Main, Etc.—L. F. Whiting, Boston. 6

FOUNDRIES.

Brooklyn Tube Works—B. T. Benton, Brooklyn. 9
Columbian Iron Works—Wm. Taylor & Sons, 11, 13 and 15 Adams street, Brooklyn, N. Y. 7
Cast Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md. 1
Continental Works—T. F. Rowland, Greenpoint. 6
Erie Basin Iron Works—Elizabeth, Dwight and Van Dyke sts., South Brooklyn, N. Y. 2, 7
Louisville Pipe Works—Dennis Long, Cor. 9th and Water-sts., Louisville, Ky. 9
Manufacturing Enamelers—Nessle & Taylor, 97 Water street, Brooklyn, N. Y. 4
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman and Wilkins streets, Pittsburgh, Pa. 7
Oregon Iron Foundry—Herring & Floyd, 738, 740, 742 and 744 Greenwich street, New York. 3
Pascal Iron Works—Morris, Taskar & Co., Philadelphia, Pa. 9
Southwark Foundry—Merrick & Sons, Fifth and Washington streets, Philadelphia. 9
Wrought Iron Pipes, etc.—Joseph Nason & Co., 61 Beekman street, New York. 4

WATER METERS, PUMPS, ETC.

Ashcroft's Low-water Detector, 50 John street, New York. 6
Aubin Water Meter—H. Q. Hawley, Albany, N. Y. 7, 9
Babcock & Wilcox's Stationary Steam Engines. 8
Davis' Steam Superheating Boiler—Duplex Steam Boiler Mf'g Company, Long Island City, N. Y. 9
Pat. Lead-Encased Tin Pipes—Colwells, Shaw & Willard, foot of West 27th street, N. Y. 4
Patent Dry Centre Valve—American Meter Company, 512 West 22d street New York. 5
Steam Pumps—H. R. Worthington, 61 Beekman st. New York. 7
Water Pipes, etc.—S. Fulton & Co. 207 North Water st Phila. 9
Water Closets, etc.—Wm. S. Carr & Co. 149, 151, 153, 155, 157 Centre street, New York. 4
Water and Sewerage Pipes—Am. Water and Gas Pipe Company northwest corner of Green and Bay sts., Jersey City, N. J. 5
Worthington's Water Meters—H. R. Worthington, 61 Beekman street, New York. 2

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, Etc., 58 Goerck street, New York. 5
Bay State Clay Retort Works, 125, 127 Water st. Boston, Mass. 6
Brooklyn Clay Retort Works, Van Dyke st. Brooklyn, N. Y. 5
Jersey City Fire Brick Works.—J. H. Gautier & Co., Greene, Essex and Bergen streets, Morris Canal Basin, N. J. 5
Laciede Fire Brick Works, 1007 North Levee, St. Louis, Mo. 3
Manhattan Clay Retort Works, 15th st. near Av. C, New York. 5
Philadelphia Fire Brick Works, Vine and 23d sts. Philadelphia. 5
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Industrial Chemistry—Prof. H. Dussauce, New Lebanon, N. Y. 2
Mining Engineer—J. H. Tiemann, 240 Pearl st. New York. 4
Sodium Amalgam &c.—Prof. Wurtz, 26 Pine st., New York. 6
School of Mines, Columbia College, East 49th st. " 2
J. S. Phillips, Mining Engineer, Wadsworth House, San Francisco, Cal. 4

LAMPS, STOVES, PETROLEUM, ETC.

Lamps—F. H. Lovell & Co 233 Pearl street, New York. 7
Street Lamps—J. G. Miner, Morrisania, Westchester Co., N.Y. 2
Lamps, &c.,—Julius Ives & Co., 49 Maiden Lane, N. Y. 9

MISCELLANEOUS.

A Rare Opportunity for Investment—Offices of this Journal. 8
Apparatus For Sale—Washington (D. C.) Gas Company. 6
Bird Cages—Osborn Manufacturing Company, 109 Bleecker st. 8
Cameron Coal Company—42 Broadway. 1
Despard Coal 1
Empire S. S. Line for Savannah, Garrison & Allen, 5 Bowling Green. 9
Empire Sewing Machine Company, 294 Bowery. 6
Finkle & Lyon Sewing Machine Company, 581 Broadway. 9
Fodell's "Book-keeping for Gas Companies". 2
Gas-Light Journal American and Foreign Patent Agency. 8
Opposition S. S. Line to California—177 West st., cor. Warren. 9
Professor Henry Wurtz—Office Gas-Light Journal. 3
Prince's Metallic Paint—D. Sloan & Co. 115 Liberty street. 5
Plastic Slate Roofing Co. 157 Broadway. 8
Pianos—Raven & Bacon, 644 and 646 Broadway, N. Y. 9
Partner Wanted—Wm. Bent, Medina, Orange County, N. Y. 8
Platinum—Vessels, Apparatus, Sheet-wire, etc.—H. M. Raynor, 748 Broadway, N. Y. 3
Roofing Materials—E. Van Orden & Co. 41 Liberty st. 4
Rubber Goods—O. B. Gray, 201 Broadway. 4
Smedberg's "Synopsis of Gas-Lighting". 2
Situation Wanted as Manager of a Gas Work. 3
Steam Cooking Apparatus—Bennett, Johnson & Co., 42 Dey st., New York. 6
Sabbaton's Patent Screening Shovels—A. T. Smithe, No. 126 Maiden Lane, New York city. 8
Smith & Sayre Manufacturing Company, 95 Liberty street. 5
Situation as Superintendent Wanted—Sup't Office G. L. Jour. 2
Situation Wanted by an Engineer of many years, Experience. 3
Treatise on the Manufacture of Gas—D. Van Nostrand, 192 Broadway, New York. 8
Ventilation—Henry A. Gouge, 254 Broadway. 6
Watches—T. B. Bynner 189 Broadway. 2
Works on the Manufacture of Gas—D. Van Nostrand, 192 Broadway, New York. 2

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Germany....B. Westerman & Co., of New York.
Great Britain....Trubner & Co., 60 Paternoster Row, London.
France.....Le Journal de l'Eclairage au Gaz, 25 Boulevard Poissonnière
Brussels, Belgium—Henri Berge.

☞ All communications to be addressed to "The Editors," No. 22 Pine Street, New York.

☞ M. L. CALLENDER & CO., Patent Solicitors, Office of *The American Gas-Light Journal*, No. 22 Pine Street, New York.

DEC. 17, 1868.